gan at Philadelphia, Princeton, New Haven, Ann Arbor, Troy, Charlottesville, and possibly elsewhere.

The weekly journal Science, for August 19, 1898, says:

The development of the American university during the past twenty-five years may perhaps be regarded as the great achievement of the nation. The foundations laid at Harvard and at Johns Hopkins within the lifetime of those students now profiting from them have been built upon, until we have now a score of universities, as places for research, equal to Oxford, and half a dozen rivaling those of Germany. The American college, though founded upon the English system, was of native growth, and the university, based upon this college, though influenced by German methods, is distinctly national, while at the same time our different institutions show a marked individuality. The American university is definitely a place for research, where both teachers and students are engaged in research and in learning the methods of research. The results of the work of the students are in large measure summarized by the theses for the doctorates, and it is interesting to know what is the outcome of the past year's research.

It appears from a somewhat careful inquiry that 18 leading universities in 1898 conferred the degree of Ph. D. on a total of 234 candidates. The latter may be classified as those devoted to the humanities (91); to history and politics (38); to the sciences (105).

The weak point of the American custom in regard to these doctorates is that in many cases the theses are not published, so that we have no means of comparing either the candidates or the standards of the respective universities among themselves; but, in general, it is believed that heavier work is required of the candidates at Harvard and Johns Hopkins than elsewhere. We see from the preceding that the small force of men engaged in scientific research throughout the United States thus receives an appreciable addition every year. The editor of Science states that the distribution of these 105 theses, that is to say of the 105 scientific students, among the different sciences was as follows:

Chemistry	27
Psychology	18
Zoology	12
Mathematics	11
Physics	11
Botany	11
Geology	6
Physiology	4
Astronomy	3
Anthropology	2

Meteorology does not appear in this list. Its problems involve questions of astronomy, physics, and mathematics. The attainment of the degree of Ph. D. in the universities quoted by Science ordinarily means at least three years of general and again three of special work, the American university course is therefore longer, and, it is said, more thorough than the average course in Germany for attaining the same degree.

At the present time the fields of instruction and investigation are rapidly increasing. Meteorology is fully ripe for its share of attention. It is very desirable that the older men in the service who are studiously inclined should by teaching, or otherwise, contribute to the study of meteorology in the universities, just as they already have done in the schools and colleges. It is equally desirable that among the studious young men who are just entering the service, those who have a good foundation in mathematics and physics, should seek to attain the degree of "Ph. D. in meteorology" at the universities located in the cities where they are stationed. Any thesis prepared by a successful candidate for this degree would certainly be worthy of publication by the Weather Bureau. The present Chief has shown every willingness, and, indeed, a great desire to stimulate the intellectual and scientific growth of the corps. We should not be distinguished merely by our work but by our knowledge, and not by knowledge only but by our researches and our additions to knowledge.

Apropos of the above remarks Mr. F. O. Stetson, a graduate of the Massachusetts Institute of Technology, says:

Meteorology, like every other science, requires for its advancement careful study, original investigation, and research. This must be carried on by men familiar with the work already done in the same field, and acquainted with the principles of that and allied sciences; men whose mental equipment is at least equal to that of the college graduate who has devoted the major part of his time to the study of science. Those graduates who engage in original investigation are actuated by one or both of two motives; interest in their work, or the belief that additional learning or a doctor's degree will bring them higher salaries and larger incomes. It is probable that the first is the predominant motive in most cases. The average college graduate, if financially dependent upon his own exertions, is apt to be impatient at the time already consumed in preparation, and to consider that time and money spent in further study can bring no adequate pecuniary recompense. Our advanced student, then, whether fresh from "Class Day" or of more mature years, selects from his specialty that which has appealed most strongly to his fancy during his undergraduate course. Under these conditions it would be extraordinary if he chose meteorology. He may have completed the usual college course in physics, scarcely knowing that such a science exists. He may have diligently studied the laws of heat and the theories of gases, without learning of their connection with winds and rainfall. There is the chance that he may inadvertently do much for meteorology by the development of some interlinked branch of physics, but the progress of this science is heavily handicapped, owing to the fact that what is already known of it is not as yet generally recognized as a necessary part of the college curriculum. To those students whose graduate studies are solely for the benefit of their pocketbooks, meteorology is even less attractive. Many of this class expect to make teaching their profession, and it needs no mathematical demonstration to show that if a subject is not to be taught, no one will prepare himself to teach it.

Progress in meteorology will result from the continued teaching, over and over again and as widely as possible, of what is already known. As the elements of the science become more generally taught, it will appeal, as a fit subject for research, to an increasing number of graduate students of both classes.

INTERNATIONAL METEOROLOGICAL SYMBOLS.

In connection with the Circular of 1884, which is reprinted on page 312, MONTHLY WEATHER REVIEW, for July, Mr. A. L. Rotch calls attention to the fact that the thunder and lightning symbol was modified by the following resolutions of the International Meteorological Conference at Paris, 1896:

1. That the symbol ⊺ be added to the International Symbols adopted by the Congress of Vienna to indicate the days on which distant thunder has been heard, and conformably to the decisions of that Congress.
2. The symbol ≤ should be reserved for distant and diffused lightning, *wetterleuchten*, sheet lightning [or heat lightning.—Editor].
3. The symbol ⊺≤ should indicate all the cases where both thunder and lightning have been observed.
4. In the résumés the number of days of thunderstorms shall be, as far as possible, taken out separately for each of the three cases.

THE SECOND WELLMAN POLAR EXPEDITION.

Mr. Walter Wellman, leader of the Wellman Polar Expedition of 1898, took with him, as meteorologist and second in command, Mr. Walter B. Baldwin, Observer, United States Weather Bureau. Mr. Baldwin sends the following short letter to the Chief of the Weather Bureau:

S. S. FRITHJOF, CAPE TEGETTHOFF,
FRANZ JOSEPH LAND, *August* 2, 1898.

I have the honor to report that since the departure of this expedition from Tromsoe, Norway, June 26, meteorological observations have been made on board the steamship *Frithjof*, as follows:

At 7 a. m., 2 p. m., and 9 p. m., on temperature of the air (dry and wet bulb), temperature and salinity of sea-water; pressure of air (Weather Bureau aneroids Nos. 1134 and 1135, and ship's aneroid with attached thermometer); and velocity, whenever possible, of wind; kind and movement of clouds.

Marine barometer No. 488, obtained from the Chicago station, was found to be out of order and could not be repaired in time to be taken along; I, therefore, left it in its case, in care of Consul Andrew Aagaard, Agent of this Expedition, Tromsoe, Norway. The two aneroids are in good order, and I shall be able to make use of the barograph in connection with them, and expect to obtain good results therefrom.

I am now preparing to lead an advance party through Austria Sound, toward Cape Fligely, and will endeavor to obtain as accurate and full meteorological data as possible, a copy of which I will forward to you at the earliest possible moment.

Local time has been used in all cases of observations thus far, and in that connection I have also located position as accurately as possible to be obtained, much of the time in fog and ice.

In an accompanying letter of August 3, at the same place, Mr. Baldwin says:

We have decided to attempt to make our northing from this point, and as the *Frithjof* will soon leave us in pursuit of walrus, I have no alternative left but to give you an earnest of my intention. * * * We will have a long, hard pull for the next year, but when we hear from our friends a year hence, it will make up for all the hardships. Papers and letters sent to us in care of our Agent at Tromsoe, Norway, Consul Andrew Aagaard, should be posted about May 1, 1898. He will forward same by next year's steamer.

I suppose by the time we return you will have established several stations in Cuba.

RECENT EARTHQUAKES.

Prof. E. W. Morley, of Adelbert College, Cleveland, Ohio, reports that no seismic disturbance was recorded on his seismometer during August and September. Prof. C. F. Marvin reports the same with regard to the seismograph at the Weather Bureau in Washington.

Sunday, August 14, at Oak Point and several other places on the St. John River, N. J. The first shock was felt at 3:45 a. m., St. John local time, viz, about 3:09 a. m., seventy-fifth meridian time. The second shock was felt at about 3:50 a. m., local, or 3:14 seventy-fifth time. [1 p. m., St. John local time, is simultaneous with 12:24:16, seventy-fifth meridian time.] The shocks were preceded by a noise, and the first shock was sufficiently strong to overturn light objects and awaken people. It seems to have been felt most at Oak Point and vicinity (N. 45° 30′, W. 66° 05′).

Friday, September 16, Mr. T. B. A. Watson, of Hartington, Nebr., writes that at 3:59 a. m. (central time) a slight earthquake shock was felt at this place (Cedar County, N. 42° 40′; W. 97° 10′). The vibration seemed to be traveling from northeast to southwest; it shook every building, rattling the windows; the approach was preceded by a rumbling sound not unlike the roll of distant thunder, followed by a distinct shock lasting one second, then vibrations for about five seconds, then another shock similar to the first; the total duration was about ten or fifteen seconds (including the preliminary rumble?—ED.). Only one similar experience, viz, the slight vibrations at 5:45 a. m., February 4, 1896, is known to have occurred at this place.

Saturday, September 17, at Morrills Corner, 3 miles distant from Portland, Me., first shock at 10:54 a. m., lasting seven seconds, followed after an interval of eleven seconds by a second shock, lasting five seconds. This is the first earthquake at that place since February 17. It was recorded on a seismograph belonging to Mr. Robert Balch, who says that the first shock deflected the needle 0.09 inch, in a series of regular waves, and the second shock deflected it 0.07 inch in two sharp waves.

THE RAINFALL OF MAY IN JAMAICA.

According to the Jamaica weather report for May, 1898, the rainfall for the whole island was 85 per cent above the average.

This result has been chiefly attained by heavy rains between the 23d and 27th of May, due to a shallow cyclonic depression which traveled from west to east, northward of Jamaica. In the west of Jamaica the heaviest rainfall occurred on the 24th, and in the eastern portion of the island on the 25th. On an average between 5 and 7 inches fell on one or the other of these days all over the island, and in the cases of 13 stations which had during the month over 10 inches in one day, all but two occurred on the 25th in the east, and the 24th in the west. A phenomenal fall of 28.66 inches occurred at Cinchona Plantation on the 25th, concerning which special inquiry was made. The Superintendent, in reply, states as follows: "I beg to say there is no mistake whatever about the rainfall (28.66 inches) here on the 25th of May. We had to measure the rain three times during the day to prevent the gauge overflowing, and of course after measuring, the water was thrown away; it was not measured over a second time. We had steady heavy rain all day on the 25th; I don't think it ceased raining for five minutes during the twenty-four hours. During the night we had high winds which blew down a number of trees." It will thus be seen that the rate of fall was not excessive, being not much more than 1 inch an hour, but the fall continued at this rate for twenty-four hours, producing the phenomenal record for the day of 28 inches.

Although the rainfall for the whole island was 85 per cent above the average, and the rainfall at Cinchona quite unprecedented, yet, the average for the island was not so large as on several previous occasions. The following table gives the heavy monthly falls since 1870, viz, those months for which the average for the whole island exceeded 15 inches:

Year.	Month.	Rainfall.	Year.	Month.	Rainfall.
1870	May	17.38	1886	June	23.42
1870	October	16.74	1888	May	20.18
1879	October	15.69	1897	October	19.30
1885	December	15.60	1898	May	16.62

NOTE.—Editorial notes for which there was no room in the MONTHLY WEATHER REVIEW for September must be deferred to the next number.—ED.

METEOROLOGICAL TABLES AND CHARTS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

For text descriptive of tables and charts see page 366 of REVIEW for August, 1898.